FACT SHEET FOR RENEWAL OF NPDES PERMIT
RAINIER STATE SCHOOL
NPDES PERMIT NO. WA0037923

This fact sheet is a companion document to the draft National Pollutant Discharge Elimination System (NPDES) Permit No. WA0037923. The Department of Ecology (Department) is proposing to issue this permit, which will allow discharge of treated municipal wastewater to waters of the state of Washington.

This fact sheet explains the nature of the proposed discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for those decisions. Public involvement information is contained in Appendix A. Definitions are included in Appendix B. Technical calculations are shown in Appendix C.

A proposed permit and fact sheet were reviewed by the Permittee for verification of facts. Only factual items were corrected in the draft permit and fact sheet. Corrections made are shown in Appendix D. A response to substantive comments will be completed at the end of the public comment period and appended to this fact sheet.

I. GENERAL INFORMATION

Applicant:	Rainier School State of Washington Department of Social and Health Services P.O. Box 600 Buckley, WA 98321
Facility:	Rainier State School Wastewater Treatment Plant NE Corner of the school property 2120 Ryan Road Buckley, Pierce County, Washington 98321
Treatment:	Municipal Secondary Treatment – Trickling Filter Chlorine Disinfection
Discharge Location:	White River at Buckley, River Mile 25.2 Latitude: 47° 10' 08" N Longitude: 121° 59' 37" W
Water Body ID No.:	WA-10-1040

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III. RECEIVING WATER INFORMATION

Characteristic Uses

The White River is designated as a Class A, freshwater, receiving water in the vicinity of the outfall. Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration, rearing and spawning; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A Washington Administrative Code (WAC). Criteria for this discharge are summarized below:

Fecal Coliform Organisms	100 colonies/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum
pH	6.5 to 8.5 standard units
Turbidty	less than 5 NTU above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics).

Puyallup River Basin TMDL

The White River is part of the Puyallup River basin. The Puyallup River basin is undergoing rapid growth that promises increasing pollution pressure on the river and increasing requests for pollutant loadings. Beginning in 1990, the Department of Ecology conducted a total maximum daily load (TMDL) study for dissolved oxygen, ammonia, and chlorine in the Puyallup River basin (White, Carbon, and Puyallup Rivers). The report from the study was published in June 1993. The TMDL study indicates that ammonia and chlorine discharged by existing permittees are likely to exceed water quality criteria. Dissolved oxygen criteria are also likely to be exceeded if significant new sources of biochemical oxygen demand (BOD) are introduced.

The study also indicates that water quality criteria for ammonia, dissolved oxygen, and chlorine can be met for the existing discharges through implementation of effluent limits based on the maximum allowable mixing zone as defined in WAC 173-201A-100.

Section 303(d) of the Clean Water Act requires states and the Environmental Protection Agency to establish TMDLs for those waters which cannot meet water quality standards after application of technology based controls. The TMDLs effective May 1 through October 31 proposed for the Puyallup River basin are:

19,500 pounds per day of BOD^5
3,300 pounds per day of ammonia (as nitrogen)

Wasteload allocations proposed for the Rainier School facility are:

61 pounds per day of BOD^5
33 pounds per day of ammonia (as nitrogen)

Additional information on the TMDL can be obtained in the Department TMDL document, June 1993.

Upstream Water Quality

The Rainier School outfall is located at River Mile (RM) 25.2. The critical condition for the Puyallup River is the seven day average low river flow with a recurrence interval of ten years (7Q10). Ambient data at critical conditions in the vicinity of the Rainier outfall was taken from the TMDL study which considered both historical data and an intensive monitoring study conducted in September-October 1990. The ambient background data used for this permit includes the following:

7Q10 low flow	292 cfs
Velocity	2.28 ft/sec
Depth	1.04 feet
Width	123 feet
Roughness (Manning)	n=0.041
Slope	9.7 E-3 (0.37 degrees)
Temperature	15°C
pH (high)	7.6
D. Oxygen	8.0 mg/L
Total Ammonia-N	0.07 mg/L
Alaklinity	21 mg/L as $CaCO_3$
Fecal Coliform	17/100 mL
Turbidity	22-51 NTU
Hardness	22.2 mg/L as $CaCO_3$
Copper	2.8 ug/L dissolved (estimated)
Zinc	10.0 ug/L dissolved (estimated)
All Other Metals	0.0 (below detection limits)

Downstream Water Quality

Downstream of the discharge (RM 24.3), a large portion of the White River flow is diverted through Lake Tapps for power generation and then returned to the White River at RM 3.6. The instream flow of the natural White River channel is currently maintained above 130 cfs all year by agreement between Puget Sound Power and Light Company and the Muckleshoot Tribe.

Section 305(b) of the Clean Water Act requires the state to assess the quality of surface waters and to identify impairment of designated beneficial uses pursuant to the state water quality standards (WAC 173-201A). The most recent assessment indicates that the White River (RM 0 to 29.6) occasionally exceeds the fecal coliform criterion. The high fecal coliform count occurs after rainfall events and appears to be related to stormwater runoff.

In addition, the water quality criteria for pH (6.5 to 8.5 standard units) is violated in the natural White River channel between diversion to and outflow from Lake Tapps. Water quality toxicity criteria for ammonia are also seasonally affected by high temperature and pH. Conditions in the White River channel appear to be most limiting for ammonia between April and November.

The following data, taken from the TMDL study, was used to characterize conditions downstream in the White River. Only those parameters which differed from the upstream conditions listed above are noted:

7Q10 low flow	130 cfs
Total Ammonia-N	0.1 mg/L
Temperature	18°C
pH (high)	8.9
Fecal Coliform	Greater than 100/100 mL

IV. FACILITY INFORMATION

Treatment Plant

The state of Washington, Department of Social and Health Services, owns and operates this wastewater treatment facility. The facility was originally constructed in 1939 and consisted of an Imhoff tank. A major revision to the facility was instituted in 1940 consisting of influent flow metering, mechanical screening, primary and secondary clarification, one trickling filter and sand beds for sludge trying. The Imhoff tank was converted to an anaerobic sludge digester. The plant was modified in 1964 and 1979 adding grit removal, a second trickling filter, two new anaerobic digesters and disinfection facilities. The last major modification, which included headworks improvements and the aerated grit chamber was completed in 1991. The plant is classified as a Class 2 facility and is operated by a staff of two certified operators. The operator in responsible charge is certified as the Class 3 level.

The plant is equipped with alarms for power or equipment failure. The Permittee has acquired a portable generator for use until on-site emergency power is available. The facility has a laboratory, which is working toward achieving state accreditation.

Collection System

The collection system consists of approximately 3 miles of conventional, gravity, sanitary sewer servicing a residential community for the developmentally disabled. There are no known points of bypass or overflow. The main trunk line is a 12-inch diameter concrete pipe.

In June 1992, the collection system was evaluated by Mc Square, Inc. consulting engineers. The engineering evaluation states that the system is badly antiquated, patched together and failing. Infiltration is a major problem, which hydraulically overloads the treatment plant. The Permittee is taking a phased approach to repair or replace the existing system. The recommended repairs are expected to be completed within a three-year time period.

Treatment Processes

Flows from the collection system are received at the headworks. Wastewater enters a manual or mechanical bar screen and flows by gravity through an aerated grit chamber to one of two rectangular primary clarifier for setting. Supernatant from the sludge digesters is also returned to the primary clarifiers. Flow continues to one of two trickling filters with rock media, which operate in parallel and then to one of the two secondary clarifiers. The treatment plant may become hydraulically overloaded during storm events and has an in-plant bypass to route a portion of the flow directly from the primary clarifier to the secondary clarifier. Effluent is disinfected by chlorine prior to discharge.

Both influent and effluent flows are measured via Parshall flume. The influent flow is used for flow reporting purposes. A schematic of the treatment processes is included in Appendix C.

Residual Solids

Screenings and grit are taken to the landfill for disposal.

Sludge from the secondary clarifiers is returned to the primary basin and the waste sludge is pumped to a two stage anaerobic digester for stabilization. The methane generated is used to fire the school boiler. The unit stabilizes approximately 6.5 tons of sludge per year. The stabilized sludge is stored in sludge drying beds, land applied on fields at the school during the summer months (May through September). The facility has a Tacoma-Pierce County Health Department Solid Waste permit for land application of the sludge, which is renewed annually in November.

Outfall

The outfall originally consisted of a 16-inch outfall and diffuser, which was submerged in the middle of the White River. The White River is glacial fed and continuously changing course. Siting of an outfall and diffuser is difficult in this dynamic environment. The diffuser is gone and any attempt at replacement would be temporary, requiring constant adjustment and repair.

The outfall was last inspected on November 15, 1993. The outfall currently consists of a 16-inch steel pipe, which discharges at the bank of the White River. In 1991, approximately 10 cubic yards were placed over the outfall to provide a protective barrier. The outfall is flush with the bank and at a 90-degree angle to the river. The bank discharge appears to function adequately and there is no discernable damage to the environment. It appears preferable to retain the bank discharge location rather than to continue to disrupt the receiving environment in an attempt to provide better initial mixing.

V. SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

Previous Permit

The previous permit for this facility was issued on June 30, 1994, for a five-year period ending June 30, 1999. The permit was modified on August 12, 1980, changing the frequency of BOD monitoring to twice per month. The City applied for permit renewal and the permit was administratively extended until the present time. An application for permit renewal was requested by a and submitted to the Department on September 22, 1993. The application was accepted as sufficient after a meeting with the Permittee on November 15, 1993.

The existing permit placed numeric effluent limitations on BOD_5, Total Suspended Solids (TSS), pH, fecal coliform, and flow. A narrative limit was placed on chlorine residual. The limits are shown in Section VIII of this fact sheet.

Design criteria in the existing permit do not match the design criteria on the plans and specifications prepared by Whitacre Engineers and approved by the Department for 1986 modifications to the wastewater treatment plant. A meeting was held on November 15, 1993, between the Department and the Permittee to discuss the design criteria. It was agreed at the meeting that the approved criteria was correct. Analysis of the discharge monitoring report data for the past three years shows the facility to be in compliance with the design criteria. The facility is currently at 85 percent of design flows and loadings, however, expansion is not expected within the next five years. Design criteria are listed in Section VII of this fact sheet. Data analysis is included in Appendix C.

Inspections

The facility received a Class 2 (sampling) compliance inspection on August 8, 1993. Records were available for inspection at the facility, and the facility was operating well at the time of inspection. Samples analyzed showed the Permittee to be in compliance with permit requirements.

The inspection report notes that the treatment plant is understaffed. In July 1986, the Department recommended an additional operator. The operators are also responsible for the school water system. However, the workload will be decreased somewhat when the responsibility for operation of the water system is assumed by the City of Buckley in 1994. This may be offset by additional work needed to comply with environmental regulations. Evaluation of the adequacy of staffing levels is required in this permit.

A grease and detergent problem existed at the facility in the mid-1980s. This has apparently been resolved through the removal of garbage disposal units.

VI. WASTEWATER CHARACATERIZATION

The discharge, as described in the NPDES permit application and discharge monitoring reports submitted to the Department, is characterized for the following regulated parameters: flow, pH, temperature, fecal coliform bacteria, biochemical oxygen demand, chlorine, total suspended solids, and dissolved oxygen. Concentrations are within typical ranges found at secondary municipal wastewater treatment plants.

Although the Permittee was not required to monitor for other parameters, ammonia-N, and phosphates have been monitored. Maximum concentrations were 6 mg/L and 5 mg/L, respectively.

Effluent sampling was conducted by the Department as part of the Puyallup TMDL study. Effluent was sampled for four days in September and October of 1990 for nitrogen, phosphorus, alkalinity, fecal coliform, turbidity, specific conductance, chloride, TSS, total organic carbon (TOC), carbonaceous biochemical oxygen demand (CBOD), hardness, and heavy metals. Concentrations are typical of municipal wastewater treatment plants. Monitoring results are summarized in Appendix C.

VII. PROPOSED PERMIT LIMITATIONS AND CONDITIONS

Federal and state regulations require that effluent limitations set forth in an NPDES permit must be either technology- or water quality based. Technology-based limitations are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Water Quality Standards (Chapter 173-201A). The more stringent of these two limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

DESIGN CRITERIA

In accordance with WAC 173-220-130(1)(a), effluent limitations shall not be less stringent than those based upon the design efficiency for the facility, including removal efficiencies, which are contained in approved engineering plans, reports, or approved revisions. Also, in accordance with WAC 173-220-150(1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are as follows:

Monthly average dry weather flow:	0.15 mgd
Monthly average wet weather flow:	0.20 mgd
Peak day:	0.42 mgd
BOD influent loading:	270 lbs/day
TSS influent loading:	270 lbs/day
Design population:	approximately 1500 (calculated as 500 residents plus staff/3)
BOD/TSS Removal efficiency:	85%

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in 40 CFR 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of treatment (AKART) for municipal wastewater.

The following technology-based limits are taken from WAC 173-221-040. Mass effluent limits for BOD and TSS are based on the design criteria and WAC 173-220-130(3)(b) and 173-221-030(11)(b):

pH:

Shall be within the range of 6 to 9 standard units

Fecal Coliform Bacteria:

Monthly Geometric Mean = 200 colonies/100 mL
Weekly Geometric Mean = 400 colonies/100 mL

Biochemical Oxygen Demand (BOD_5):

1. Monthly Limits

   The (30-day) average shall not exceed the more stringent of the following:

   a. 30 mg/L
   b. 85 percent removal of the average influent concentration
   c. 40.5 lbs/day
      Calculation: 0.15 x design influent loading.

2. Weekly Limits

   The (7-day) average shall not exceed:

   a. 45 mg/L
   b. 60.8 lbs/day
      Calculation: 1.5 x monthly mass limit

Total Suspended Solids (TSS):

1. Monthly Limits

   The (30-day) average shall not exceed the more stringent of the following:

   a. 30 mg/L
   b. 85 percent removal of the average influent concentration
   c. 24.3 lbs/day
      Calculation: 0.15 x influent design mass loading

2. Weekly Limits

   The (7-day) average shall not exceed:

   a. 45 mg/L
   b. 36.5 lbs/day
      Calculation: 1.5 x the monthly average mass limit.

WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states the waste discharge permits shall be conditioned such that the discharge will meet established Water Quality Standards. The Washington State Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the waters of the state.

For discussion of the classification and status of the receiving water, see Section III of this fact sheet. Several elements of the state's Water Quality Standards applicable to all facilities are described in Figure 1.

Numeric Criteria

"Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards (Chapter 173-201A WAC), which specify the allowable levels of pollutants in a receiving water. Numerical criteria for dissolved oxygen and turbidity are among the criteria contained in WAC 173-201A-030. Numerical criteria are also listed for many toxic substances including chlorine and ammonia (WAC 173-201A-040).

Numeric criteria set forth in the Water Quality Standards are used to derive the effluent limits in a discharge permit. When water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) are used to limit acute and chronic toxicity, radioactivity, and other deleterious materials, and prohibit the impairment of the aesthetic value of the waters of the state. Narrative criteria describe the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

Antidegradation Policy

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the state Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Mixing Zones

The Water Quality Standards allow the Department to authorize mixing zones around a point of discharge in establishing water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment at the point of discharge. The concentration of pollutants at the edge of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving AKART.

Figure 1

Major elements of the State of Washington Water Quality Standards

Mixing Zone Authorization

Because of the potential for pollutants in the proposed discharge to exceed water quality criteria, a mixing zone has been authorized in this permit in accordance with Chapter 173-201A WAC. The mixing zone must meet the most stringent combination of the following:

1. Maximum allowable length = 300 feet downstream
   100 feet upstream

2. Maximum allowable width = 31 feet
   (25% of the river width)

3. Maximum allowable dilution factor = 315
   (25% of the 7Q10 flow)

The dilution at the boundaries of the allowable mixing zone was modeled using Cormix 3. Calculations are shown in Appendix C. The centerline dilution at 300 feet downstream was the most stringent of the conditions. The mixing zone is defined by the length, 300 feet downstream. The corresponding dilution factor is 64.

Acute

Acute toxicity criteria are to be met as near to the point of discharge as possible. A zone where acute criteria may be exceeded must meet the most stringent combination of the following:

1. Maximum allowable length = 300 feet downstream
   10 feet upstream

2. Maximum allowable width = 31 feet
   (25% of the river width)

3. Maximum allowable dilution factor = 19.4
   (2.5% of the 7Q10 flow)

The dilution at the boundaries of the allowable acute zone was modeled using Cormix 3. Calculations are shown in Appendix C. The centerline dilution at 30 feet downstream was the most stringent of the conditions and will be used in this permit. The zone where acute criteria may be exceeded is defined by the length, 30 feet downstream. The corresponding dilution factor is 12.

Water Quality-Based Limits for Numeric Criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants—their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water. Water quality-based limits are derived for the waterbody's critical condition as defined in Section III of this fact sheet. The critical condition represents

the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota and existing or characteristic water body uses.

Near-field Pollutants

Turbidity and pH criteria are met at the point of discharge.

Temperature was modeled by simple mixing using the maximum effluent temperature reported (24 degrees Celsius) at the boundary of the mixing zone as follows: (24° x 1 = 15° x 63) / 64 = 15.1 degrees. The water quality criteria are met within the boundaries of the authorized mixing zone; no additional limit is required.

Fecal coliform compliance (geometric mean) was modeled by mixing using the weekly technology-based effluent limits as follows: (log(400) x 1 + log(17) x 63) / 64 = 1.25 (antilog = 17.9/100 mL). The water quality criteria are met within the boundaries of the authorized mixing zone; no additional limit is required.

Toxics

The following toxics were determined to be present in the discharge: chlorine, ammonia, copper, mercury, silver, lead, and zinc. A reasonable potential analysis (See Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit. Based on this analysis, a reasonable potential was shown for chlorine and ammonia, copper, and zinc.

Effluent limitations were calculated for chlorine, ammonia, copper, and zinc based on procedures in EPA, 91. The calculations are shown in Appendix C. The proposed limitations are shown in Section VIII of this fact sheet.

Effluent limitations for metals are complicated by the following considerations:

1. The variability of concentrations in the effluent and the frequency of sampling are used to establish monthly average effluent limitations. Since there is limited data (2 samples) to calculate variability and since sampling will be required only once every three months, monthly average effluent limitations for metals were not established at this time.

2. Low receiving water hardness results in stringent water quality criteria for cadmium, copper, lead, nickel, silver, and zinc. Therefore, hardness was calculated via simple mixing at the boundaries of the acute and chronic mixing zones.

   (Effluent hardness + (Dilution factor (DF)-1) x ambient hardness)/DF = hardness
   Acute: (36.4 mg/L + (12 – 1) x 22.2 mg/L)/ 12 = 23.4 mg/L
   Chronic: (36.4 mg/L + (64 – 1) x 22.2 mg/L)/ 64 = 22.4 mg/L

3. The Department applies metals criteria conservatively as total recoverable values in accordance with WAC 173-201A. The criteria in WAC 173-201A are written as dissolved criteria for copper, nickel, lead, silver, and zinc. Data was translated to total recoverable values using the procedure in the October 1993 EPA technical guidance memorandum for comparison with effluent concentrations.

   The Permittee reserves the right to provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Metals criteria may

be adjusted on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge. The TMDL data shows that this may not be practical due to the extremely low concentrations of metals in the receiving water.

Metals criteria may also be adjusted using the water effects ratio approach established by USEPA, as generally guided by the procedures in USEPA Water Quality Standards Handbook, December 1983, as supplemented or replaced.

4. Wastewater treatment plants have not been designed for metals removal at the low concentrations needed for compliance with the water quality criteria. WAC 173-201A-100 provides for granting an exceedance from the numeric mixing zone size criteria for discharges existing prior to November 24, 1992, provided that:

   a. All known available and reasonable methods of treatment (AKART) is fully applied.

   b. All siting, technological, and managerial options, which would result in full or significantly closer compliance that are economically achievable are being utilized.

   c. The exceedance would not have a reasonable potential to cause a loss of sensitive or important habitat, interfere with existing or characteristic uses of the water body, result in damage to the ecosystem or adversely affect public health as determined by the Department.

The Department is currently preparing guidance for the Permittee to make the above demonstrations. If a demonstration justifying less stringent effluent limitations for metals is approved by the Department, any required effluent limits shall be based on that demonstration.

Far-field Pollutants

Nutrients: The pH criterion is violated in the natural White River. This is most likely due to algal productivity. Reduction may be achievable by limiting the amount of nutrients (nitrogen and phosphorus) discharged. However, nutrient loadings would have to be quite low (less than 0.10 mg/L dissolved inorganic nitrogen (DIN) or less than 0.025 mg/L soluble reactive phosphorus (SRP) to achieve the desired reduction. Reduction in point source loadings may not reduce ambient concentrations to the required levels. At this time, algal activity is not causing any aesthetic problems. A feasibility study for reduction in nutrients discharged is required in this permit.

Fecal coliform: Criterion is also violated downstream. Water quality data indicates that a significant fraction of the fecal coliform count is Klebsiella, which is found in wood products and is not an indicator organism for the presence of human pathogens. Fecal coliform counts also appear to increase significantly after rain events indicating a non-point source of pollution. Since fecal coliform limits are not exceeded at the mixing zone boundaries during dry weather conditions, additional restrictions on the municipal discharge are not expected to improve the situation and are therefore not required by this permit.

TMDL: Daily maximum mass limitations (pounds/day) for ammonia and biochemical oxygen demand are based on the recommendations in the Puyallup River TMDL. These limits are expected to be protective of dissolved oxygen and chlorine toxicity criteria in all segments of the Puyallup River basin.

Interim Limitations/Schedule of Compliance

The Permittee will need time to make the changes necessary to achieve the water quality based limits established in this permit. Therefore, interim effluent limitations and a schedule of compliance will be necessary.

Ammonia – Monitoring records at the treatment plant indicate that the ammonia limits are consistently met. Therefore, no interim limits are necessary.

Chlorine – Discharge monitoring reports show that chlorine concentrations currently discharged will exceed the chlorine limitations. Therefore, interim limits and a compliance schedule are established in this permit.

Since the acute toxicity requirements was the limiting condition, interim limits were calculated based on the chronic toxicity requirements. Calculations are shown in Appendix C. The proposed interim limits are listed in Section VIII of this fact sheet. These proposed interim limits were compared to the existing effluent data for chlorine and are shown to be achievable by this facility.

Chlorine limits are usually met through the addition of dechlorination equipment or through installation of an alternative (non-chlorine) method of disinfection such as ultraviolet light. The technology is established and straightforward. Allowing for construction and budgetary constraints, final chlorine limits should be achievable within one year following the issue date of this permit.

Metals

Interim daily maximum limitations for copper and zinc are established by multiplying the maximum concentration measured in the effluent by appropriate multiplier in EPA, 1991, page 56, to estimate the maximum expected effluent concentration. Calculations are shown on the Excel spreadsheet in Appendix C. The Permittee is expected to be able to achieve these interim limits based on existing treatment plant performance.

Whole Effluent Toxicity

In addition to the requirement not to exceed specific chemical parameters, the Water Quality Standards require that the effluent not cause toxic effects in the receiving waters. Identified possible sources of toxicity include chlorine, ammonia, and heavy metals commonly present in domestic wastewater.

Unidentified sources of toxicity are not expected to be present in the effluent from this small domestic discharge. No whole effluent toxicity testing is required in this permit.

Human Health

The conditions in this permit seek to protect aquatic life from toxic effects. Criteria for protecting aquatic life is usually a more stringent requirement which will also protect the health of humans. If the Department finds that this permit does not protect human health, the permit will be modified to incorporate new conditions as needed.

Sediment Quality

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

VIII. COMPARISON OF LIMITS WITH THE PREVIOUS PERMIT

	EXISTING PERMIT		PROPOSED PERMIT			
PARAMETER	**Monthly Avg.**	**Weekly Avg.**	**Monthly Avg.**		**Weekly Avg.**	
BOD	30 mg/L 105 lbs/day 85% removal	45 mg/L 158 lbs/day	30 mg/L 40.5 lbs/day 85% removal		45 mg/L 60.8 lbs/day	
TSS	30 mg/L 105 lbs/day 85% removal	45 mg/L 158 lbs/day	30 mg/L 24.5 lbs/day 85% removal		45 mg/L 36.5 lbs/day	
Fecal Coliform	200/100 mL	400/100 mL	200/100 mL		400/100 mL	
pH	6.0 to 9.0 standard units		6.0 to 9.0 standard units			
	Monthly Avg.	**Daily Max.**	**Monthly Avg.**		**Daily Max.**	
Flow		0.42 MGD	0.20 MGD		0.42 MGD	
Ammonia-N			5 mg/L		9 mg/L	
Ammonia-N (May-Oct)					33 lbs/day	
			Interim	**Final**	**Interim**	**Final**
Chlorine	Narrative	Narrative	0.44 mg/L	0.08 mg/L	1.2 mg/L	0.23 mg/L
Copper					120 ug/L	51 ug/L
Zinc					336 ug/L	300 ug/L

IX. MONITORING AND REPORTING

Effluent monitoring, recording, and reporting are required (WAC 173-220-210) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved. Sludge monitoring is required in accordance with 40 CFR 122.44(a)(2).

The monitoring and testing schedule is detailed in the permit under Condition S2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of the Department Permit Writer's Manual for trickling filter plants less than 0.5 MGD average design flow. This frequency of monitoring is considered to be the minimum frequency to document compliance.

X. BASIS FOR OTHER PERMIT CONDITIONS

Operator Certification

The Department has classified the existing facility as a Class 2 Municipal Wastewater Treatment Plant. Chapter 70.95 RCW requires that every operator in responsible charge of operation and maintenance of a wastewater treatment plant be certified at a level equal to or higher than the classification orating of the treatment plant being operated. In addition, the operator in charge of each shift shall be certified at a level no lower than one class below the plant classification.

Laboratory Accreditation

The Rainier School Wastewater Treatment Plant is classified by EPA as a minor discharge. WAC 173-220-210(4)(a) requires that all monitoring data submitted to the Department must be prepared by a laboratory accredited under the provisions of Chapter 173-50 WAC by July 1, 1994.

Prevention of Facility Overloading

Overloading of the treatment plant may result in a violation of the terms and conditions of the permit. To prevent this from occurring, Chapter 90.48.110 RCW and WAC 173-220-150 require the Permittee to take the actions detailed in permit Condition S4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S4 restricts the amount of flow.

Operation and Maintenance (O & M)

The proposed permit contains Condition S5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

Residual Solids Handling

To prevent water quality problems occurring from the improper storage, handling, or disposal of solid wastes, the Permittee is required in permit Condition S7 to handle and dispose of all residual solids in accordance with the requirements of RCW 90.48.080 and the jurisdiction health department; the Department-required management plan (WAC 173-240-060(3)(m)); State Water Quality Standards; and applicable federal laws.

On March 22, 1993, new federal regulations, 40 CFR Part 503, became effective governing land application, land disposal, and incineration of domestic sewage sludges. These regulations promote beneficial use and ensure that public health and the environment are protected from potentially adverse effects of pollutants found in domestic sewage sludge. Specific requirements are detailed in the regulation.

The new requirements are designed to be self-implementing. That is, any facility producing, treating, or disposing of domestic sewage sludge must comply with the limitations and provisions of the regulation whether or not a permit has been issued.

The compliance deadline for meeting 40 CFR Part 503 requirements other than monitoring, record keeping and report was February 19, 1994, unless construction is required. When construction is necessary, the deadline is extended until February 19, 1995.

Requirements for monitoring and record keeping became effective on July 20, 1993. Reporting requirements were effective on February 19, 1994.

Permit application information on sludge is due from facilities with NPDES permits at the time of permit renewal. The sludge program has not yet been formally delegated to the Department from the United States Environmental Protection Agency (EPA). In the interim, EPA Region 10, has instructed Permittees that submission of information to the Department meets the application requirement. Rainier State School has submitted this information.

Requirements for monitoring and record keeping are included in this permit.

Pretreatment

Permit Condition S8 prohibits non-domestic discharges that would pass-through the treatment works or interfere with operation or performance in accordance with 40 CFR 403.5B. Significant commercial and industrial operations are not allowed to discharge wastes to the Permittee's sewage system without prior authorization from the Department.

Outfall Evaluation

Permit Condition S9 requires the Permittee to conduct an outfall inspection every month and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and to determine if sediment is accumulating in the vicinity of the outfall.

XI. GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all NPDES permits issued by the Department.

XII. PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies. The Department may also modify this permit as a result of new or amended state or federal regulations.

XIII. RECOMMENDATION FOR PERMIT ISSUANCE

This permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for five years.

APPENDIX B—DEFINITIONS

Acute Toxicity—The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

Ambient Water Quality—The existing environmental condition of the water in a receiving water body.

Ammonia—Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

BOD_5—Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Chlorine—Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity—The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's life span or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effect of a compound or combination of compounds.

Class 1 Inspection—A walk-through inspection of a facility that includes a visual inspection and some examination of facility records. It may also include a review of the facility's record of environmental compliance.

Class 2 Inspection—A walk-through inspection of a facility that includes the elements of a Class 1 Inspection plus sampling and testing of wastewaters. It may also include a review of the facility's record of environmental compliance.

Critical Condition—The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Fecal Coliform Bacteria—Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Mixing Zone—An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A).

National Pollutant Discharge Elimination System (NPDES)—The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these

permits. NPDES permit issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH—The pH of liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Technology-based Effluent Limit—A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)—Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Water Quality-based Effluent Limit—A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C—TECHNICAL CALCULATIONS

FLOW CALCULATIONS:

Discharge monitoring report data for flow is presented on an Excel spreadsheet in this section. The following flow data is used in calculation dilution factors and effluent limits in the draft permit:

1. 0.20 MGD = Monthly average design flow, maximum month is used in calculations for monthly average mass (pounds per day) limits.

2. 0.42 MGD = Maximum daily design flow is used in calculations for maximum daily mass (pounds per day) limits.

3. 0.15 MGD = Monthly average dry weather design flow is used in calculations for effluent mixing models for chronic dilution factors.

4. 0.26 MGD = 0.15 MGD x daily peaking factor of 1.71 calculated from discharge monitoring report daily flow data for Rainier State School for the period 1991-1993 is used in calculations for effluent mixing models for acute dilution factors.

BIOCHEMICAL OXYGEN DEMAND AND TOTAL SUSPENDED SOLIDS:

Discharge monitoring data for BOD and TSS are presented on an Excel spreadsheet in this section. The data shows that secondary treatment effluent limitations of 30 mg/L monthly average and 45 mg/L weekly average are consistently achievable. The data also shows that 85 percent removal of monthly average influent concentrations is consistently achievable through proper operation and maintenance of the facility.

CALCULATION OF DILUTION FACTORS:

Ambient Critical Flow = 192 cfs (7Q10) low flow as shown in the Puyallup River basin TMDL.

The Department evaluated acute and chronic dilution factors at the boundaries of the authorized mixing zone using WAC 173-201A and the Cornell Mixing Zone Expert System, Cormix 3 model. The Cormix 3 prediction files for calculation centerline dilution at the chronic and acute mixing zone boundaries are shown in this section.

DETERMINATION OF REASONABLE POTENTIAL

Reasonable potential was calculated using the method in EPA, 1991, as shown on the accompanying spreadsheet. The following variables were used for each pollutant to determine the reasonable potential for violations:

Coefficient of Variation (CV)

This is a measure of variability of a pollutant in the effluent and is calculated as the standard deviation divided by the mean. When less than ten data points are available a value of 0.6 is used (EPA, 1991). This value is representative of the variability of the conventional pollutants from municipal treatment plants and therefore, is used to estimate the variability of other pollutants.

Number of Samples (n)

The number of samples of the pollutant measured in the effluent from which the determination is being made.

Effluent Maximum Concentration

The highest value of the data points used.

Multiplier

A value calculated as shown in EPA, 1991, to estimate the expected maximum concentration of the pollutant (95^{th} percentile) in the effluent at a 99 percent confidence level by multiplying the value by the effluent maximum concentration.

Acute and Chronic Dilution Factors

The dilution factors calculated for this discharge at the boundaries of the authorized mixing zone.

Ambient Concentration

Background concentration of the pollutant in the receiving water.

Water Quality Criterion

Value for the pollutant as determined from Chapter 173-201A WAC.

The maximum expected concentration is added to the ambient concentration of the pollutant in the receiving water. This sum is then divided by the dilution factor to determine the concentration of the pollutant at the edge of the mixing zone. If the resultant concentration at the edge of the mixing zone exceeds the water quality criterion, an effluent limit is imposed.

CALCULATION OF WATER QUALITY-BASED EFFLUENT LIMITS

Water Quality-based effluent limits were calculated as shown on the accompanying spreadsheets using the following method from EPA, 1991.

Maximum Daily Limit = MDL

Where:

σ^2=1n[CV^2 = 1]

z = 2.326 (99^{th} percentile occurrence probability)

LTA = Long-term average

Average Monthly Limit = AML

Where:

σ^2=1n[(CV^2 ÷ n) = 1]

n = number of samples/month

z = 1.645 (95^{th} percentile occurrence probability)

Limiting Long-Term Average (LTA) = LTA_a (acute) or LTA_c (chronic), whichever is smaller

$LTA_a = WLA_a \times e^{[0.5\sigma 2-z\sigma]}$

Where:

σ^2=1n[CV^2 = 1]

z = 2.326

WLA_a = Wasteload allocation (acute) = (acute criteria) x (acute zone dilution factor)

$LTA_c = WLA_a \times e^{[0.5\sigma 2-z\sigma]}$

Where:

σ^2=1n[(CV^2 ÷ 4) + 1]

z = 1.645

WLA_c = Wasteload allocation (chronic) = chronic criteria x chronic zone dilution factor.

For both chlorine and ammonia, the limiting LTA is the LTA_a (acute). Interim limitations are calculated using the less stringent LTC_c (chronic).

APPENDIX D—CORRECTIONS TO PROPOSED FACT SHEET AND PERMIT

A proposed permit and fact sheet were reviewed by the Permittee for verification of facts. Only factual items were corrected in the draft permit and fact sheet. Corrections made are shown below. A response to substantive comments will be completed at the end of the public comment period and appended to this fact sheet.

1. Permit Conditions S5.A is corrected as follows: An operator certified for a Class ~~I~~ 2 plant by the state of Washington shall be in responsible charge of the day-to-day operation of the wastewater treatment plant.

2. Permit and fact sheet correction to Reasonable Potential Calculations. Confidence interval on the reasonable potential spreadsheet is corrected from 0.99 to 0.95 to match Department guidance received April 13, 1994. This change decreases the "multiplier" used in reasonable potential calculations. No parameters "dropped out" from requiring effluent limitations through the use of the reduced reasonable potential multiplier. The interim limits for copper, mercury, and zinc, which are based on the "multiplier" are more stringent:

   Copper interim limit changed from 160 ug/L to 120 ug/L
   Zinc interim limit changed from 449 ug/L to 336 ug/L

REFERENCES FOR TEST AND APPENDICIES

Environmental Protection Agency (EPA)

October 1993. Office of Water Policy and Technical Guidance on Interpretation ad Implementation of Aquatic Life Metals criteria.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington DC.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

MC Squared Engineering

August 24, 1992. A Report on the Condition of the Storm and Sanitary Sewers at Rainier School.

Washington State Department of Ecology (Ecology)

June 1993. Puyallup River Total Maximum Daily Load for Biochemical Oxygen Demand, Ammonia, and Residual Chlorine.

Whitacre Engineering

1985-88. Engineering Report and Plans and Specifications for Upgrade of Rainier School Wastewater Treatment Plant.